

Rash Observations About West Nile Virus — Colorado, 2003

Dayna Ferguson, MD

**Colorado Dept of Public Health
and Environment**

**Office of Workforce and
Career Development, CDC**



2 Rash Investigations

- **Clinical description of rash associated with WNV fever**
- **Analysis of Colorado 2003 surveillance data**

WNV-Associated Rash Description

- **Erythematous maculopapules**
- **Neck, trunk, arms and legs**
- **19%–57% of patients with
WNV disease**

Rash Investigation

- **Goal – describe WNV-associated rash**
- **Case definition**
 - **≥ 18 years**
 - **New rash**
 - **Fever, headache or myalgias**
 - **Positive anti-WNV IgM**
 - **WNV fever**
- **Clinicians described rash**
- **Questionnaire**

Demographics (n=17)

Median age, y (range)	43	(24–65)
Female, n (%)	10	(59)

Rash Timeline

	Median	Range
Illness duration, d	14	(7–123)
Rash duration, d	7	(3–28)
Illness–Rash, d	5	(0–7)

Rash Description (n=17)

Description	No.	(%)
Maculopapular	13	(76)
Macular	3	(18)
Vesicular	1	(6)

Rash Distribution (n=17)

Site of rash	No.	(%)
Trunk	16	(94)
Upper extremities	15	(88)
Lower extremities	13	(76)
Head/neck	9	(53)

Additional Findings (n=17)

Characteristic	No.	(%)
Dysesthesia	6	(35)
Hyperesthesia	3	(18)
Pruritis	5	(29)

Maculopapular Rash – Thigh



Maculopapular Rash - Back



Maculopapular Rash - Flank



IgM Test Results

	Median, d	Range
Acute test pos (n=6)		
Onset-test 1	17	(7-25)
Acute test neg (n=11)		
Onset-test 1	5	(0-8)
Onset-test 2	23	(11-42)

Summary of Rash Characteristics

New Findings

- **Nonspecific pattern of onset and spread**
- **Dysesthesia & hyperesthesia were somewhat common**
- **Pruritis was somewhat common**
- **Rash does not appear to be antibody mediated**

Analysis of Colorado 2003 Surveillance Data

- **How common is rash in WNV disease?**
- **Is rash associated with outcome?**

Surveillance Case Definition

- **Colorado resident**
- **2003**
- **Compatible illness**
- **Positive serum or CSF anti-WNV IgM**

WNV Disease Category

- **Fever**
 - **Compatible illness**
 - **No evidence CNS disease**
- **Meningitis**
 - **Evidence of CNS disease**
 - **Normal mental status**

WNV Disease Category

- **Encephalitis**
 - **Evidence of CNS disease**
 - **Altered mental status**
- **Acute flaccid paralysis**
 - **Not counted**

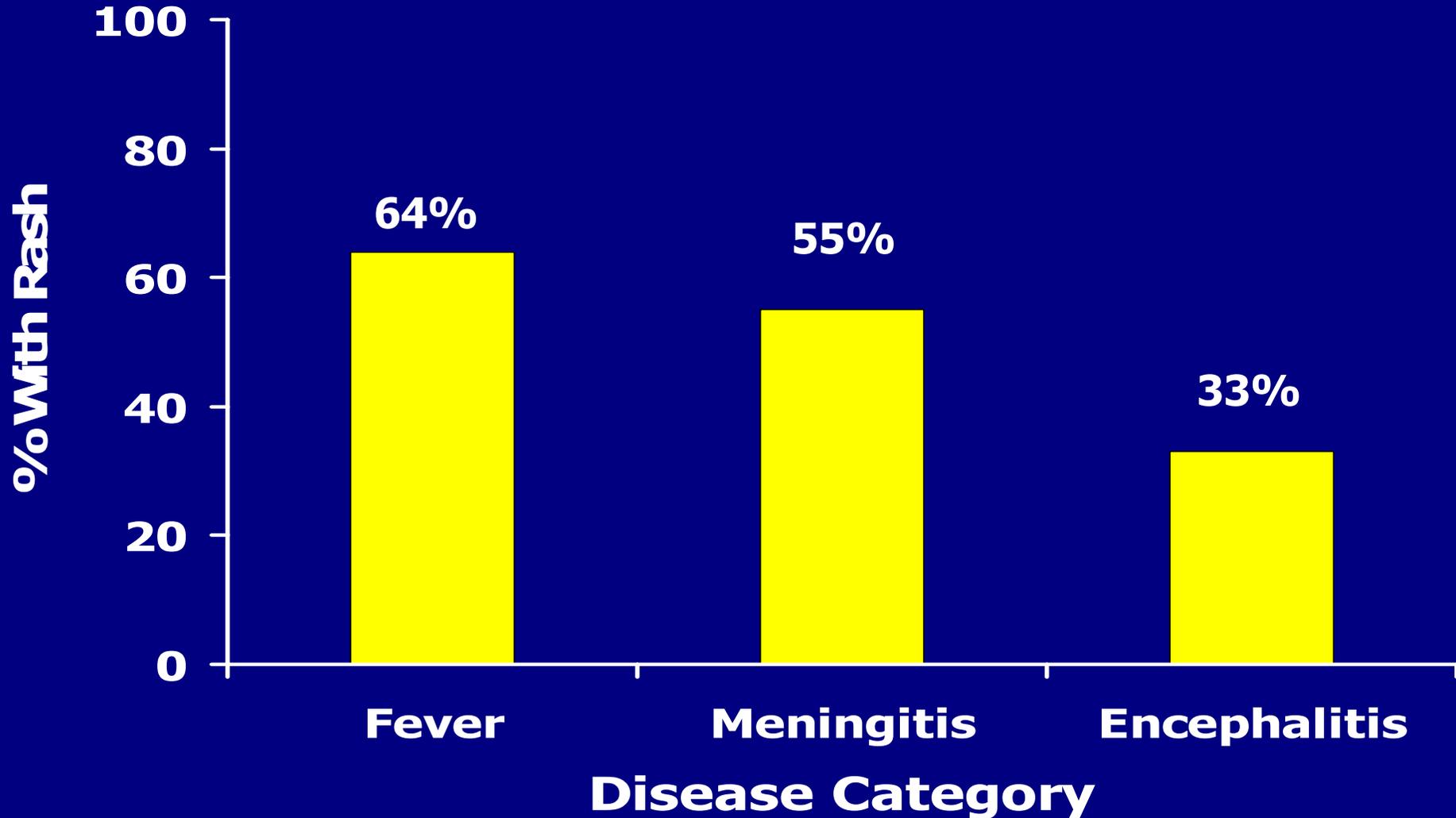
Surveillance Data Collection

- **Lab reportable condition**
- **Standard interview**
- **Chart review**
- **Death certificates**

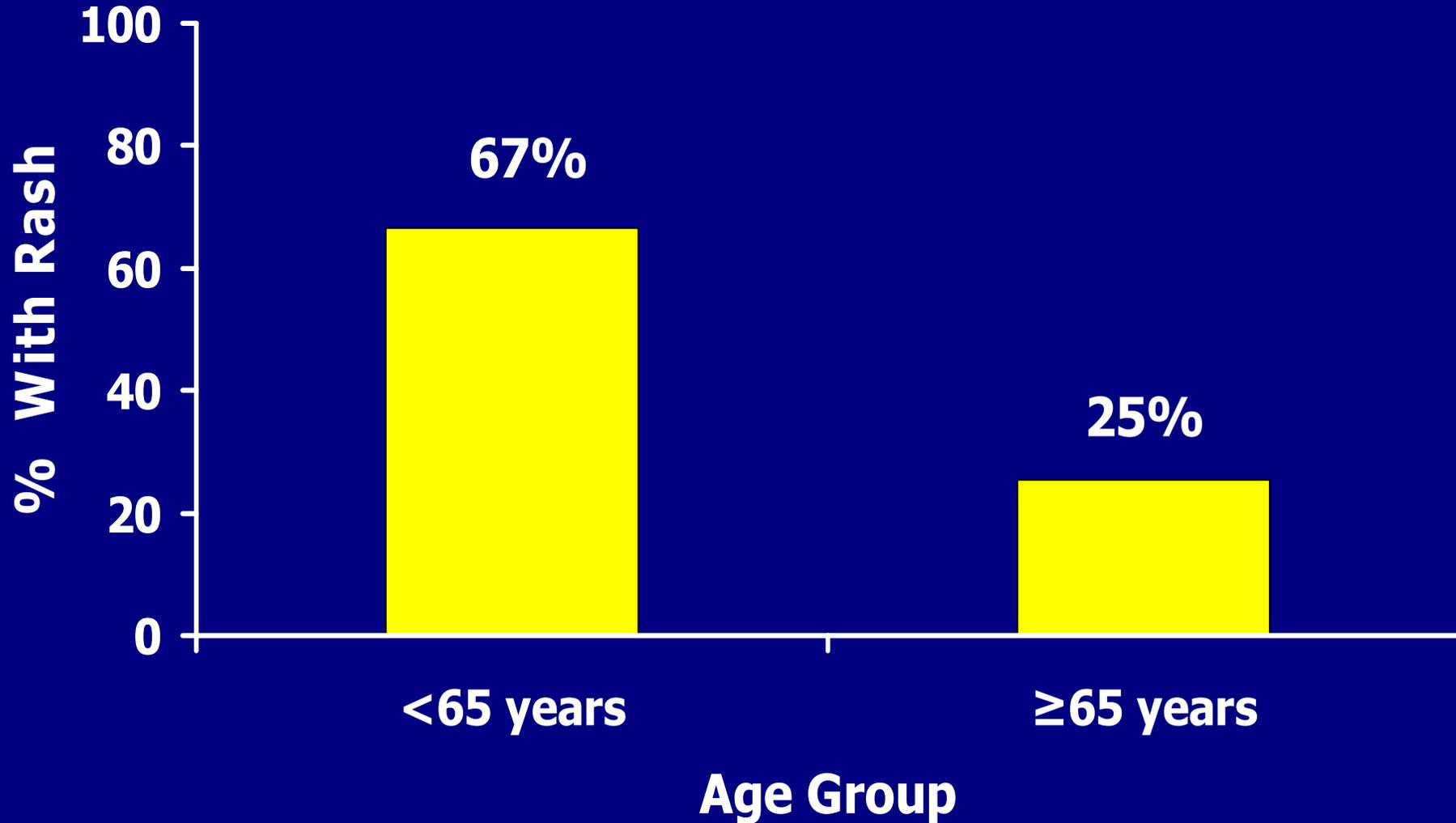
2003 Surveillance Results (n=2626)

Characteristic	No.	(%)
Rash	1564	(60)
Female	1344	(51)
≥65 years	455	(17)
Died	63	(2)

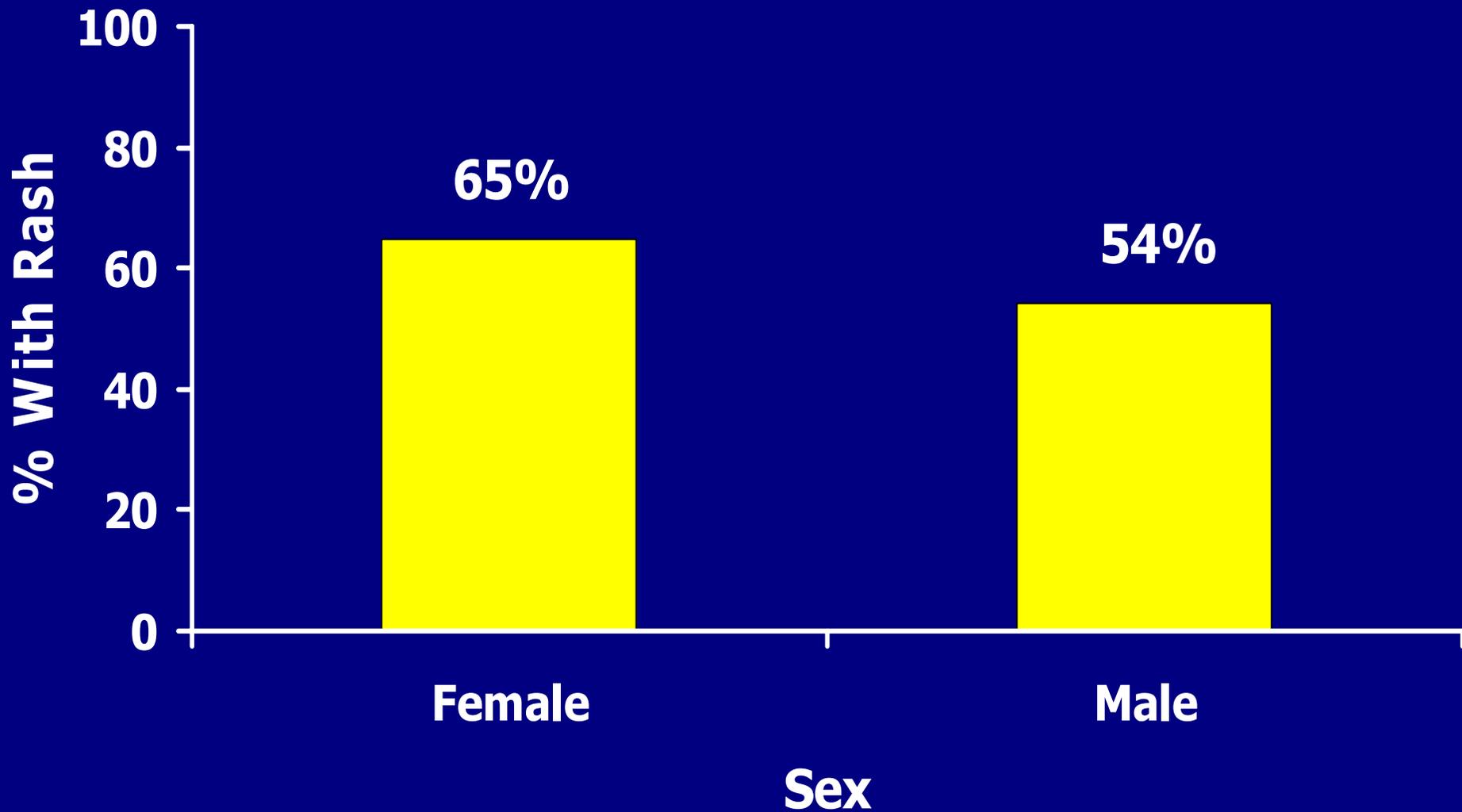
Rash by Disease Category



Rash by Age Group



Rash by Sex



Association between Disease Category and Rash

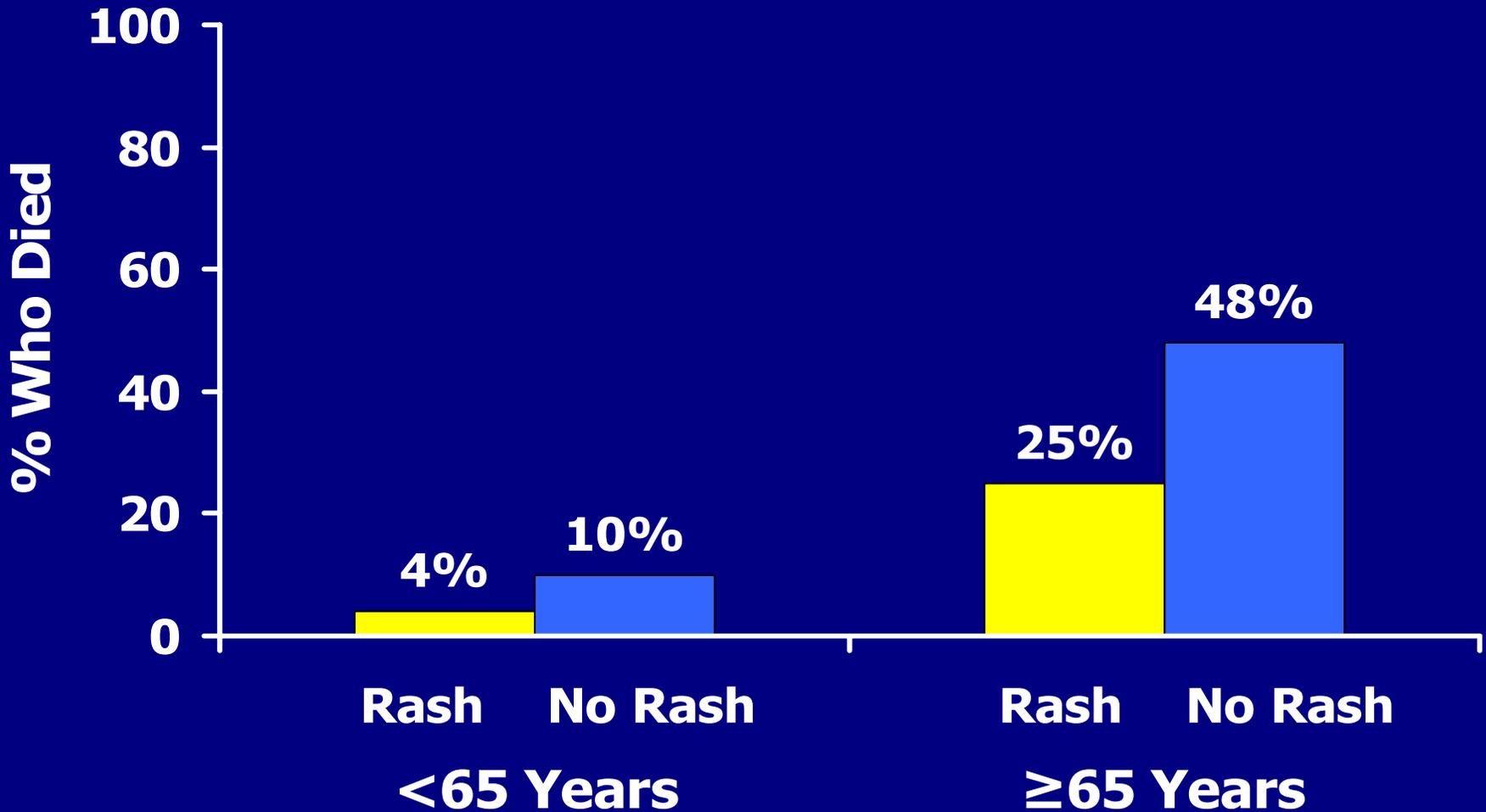
Disease category	AOR*	(95% CI)
Fever	1	Ref
Meningitis	0.7	(0.6–0.9)
Encephalitis	0.5	(0.3–0.6)

***Adjusted for age group, sex, and
age group by sex**

Risk Factors for Death

- **63 total deaths**
- **61 (97%) WNV encephalitis**

Encephalitis Deaths by Age Group and Rash



Association between Age Group, Rash, Sex, and Death

Variable	AOR	95% CI
<65 years	0.1	(0.05–0.3)
Rash	0.3	(0.1–0.8)
Female	0.8	(0.4–1.6)

Rash is Protective

New Finding

- **Rash associated with 70% reduction in likelihood of death among encephalitis patients**

Rash Associated with Disease Category, Age Group and Sex

New Finding

- **Rash reported more frequently by specific patients with WNV disease**
 - **Fever > Meningitis > Encephalitis**
 - **Younger age > Older age**
 - **Females > Males**

Possible Interpretation

- **Host immune factors associated with rash**
- **Protective against severe disease**
- **Protective against death**

Limitations

- **Interviews of sickest patients through family members**
- **Rash might influence healthcare-seeking behavior**
- **Potential misclassification of disease categories**

Summary – 1st Study

- **WNV can cause generalized erythematous, maculopapular rash**
- **Might be associated with dysesthesia and pruritis**
- **Nonspecific pattern of onset and spread**
- **Febrile rash illness during WNV season can facilitate diagnosis**

Summary – 2nd Study

- **Rash is common symptom of WNV disease – 60% of patients**
- **Rash occurs more frequently in specific subgroups**
 - **WNV fever**
 - **Younger patients**
 - **Females**
- **Rash associated with decreased risk of death**

Recommendations

- **Confirm findings with other surveillance data**
- **Study pathogenesis of rash**

Acknowledgments

Local Health Dept Staff

CDPHE

- Steve Burnite
- Ken Gershman
- Nicole Haubert
- John Pape

LCDHE

- Adrienne Lebailly

DVBID – CDC

- Ned Hayes
- Lyle Petersen

OWCD – CDC

- Anindya De
- Tom Török

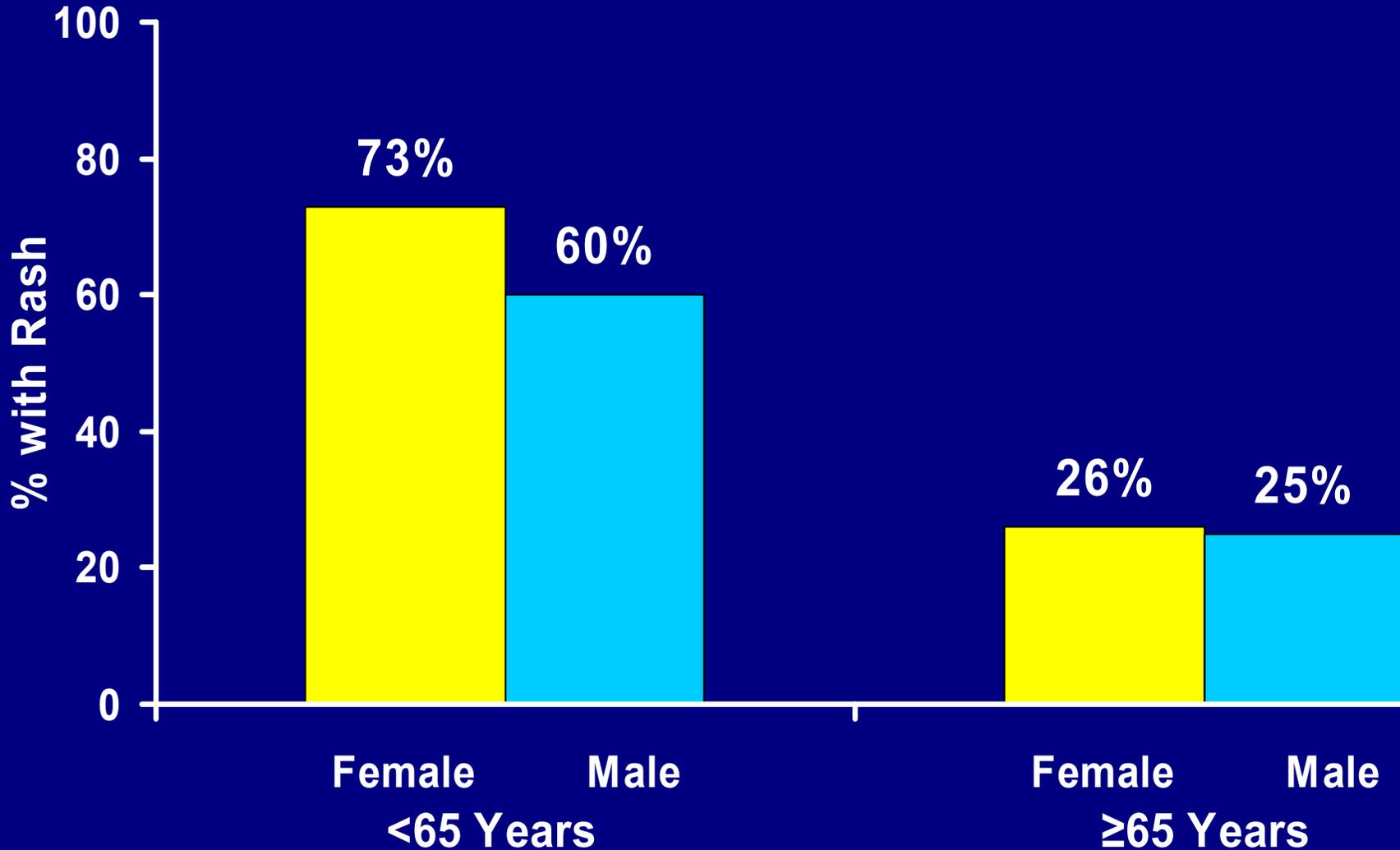
Family Practice Assoc

- James Sprowell

Surveillance Results – Colorado, 2003

Disease Category	Interviewed/Total	(%)
Fever	2002 / 2280	(88)
Meningitis	379 / 420	(90)
Encephalitis	244 / 246	(99)
Unknown	1 / 1	(100)
Total	2626 / 2947	(89)

Rash by Age Group and Sex

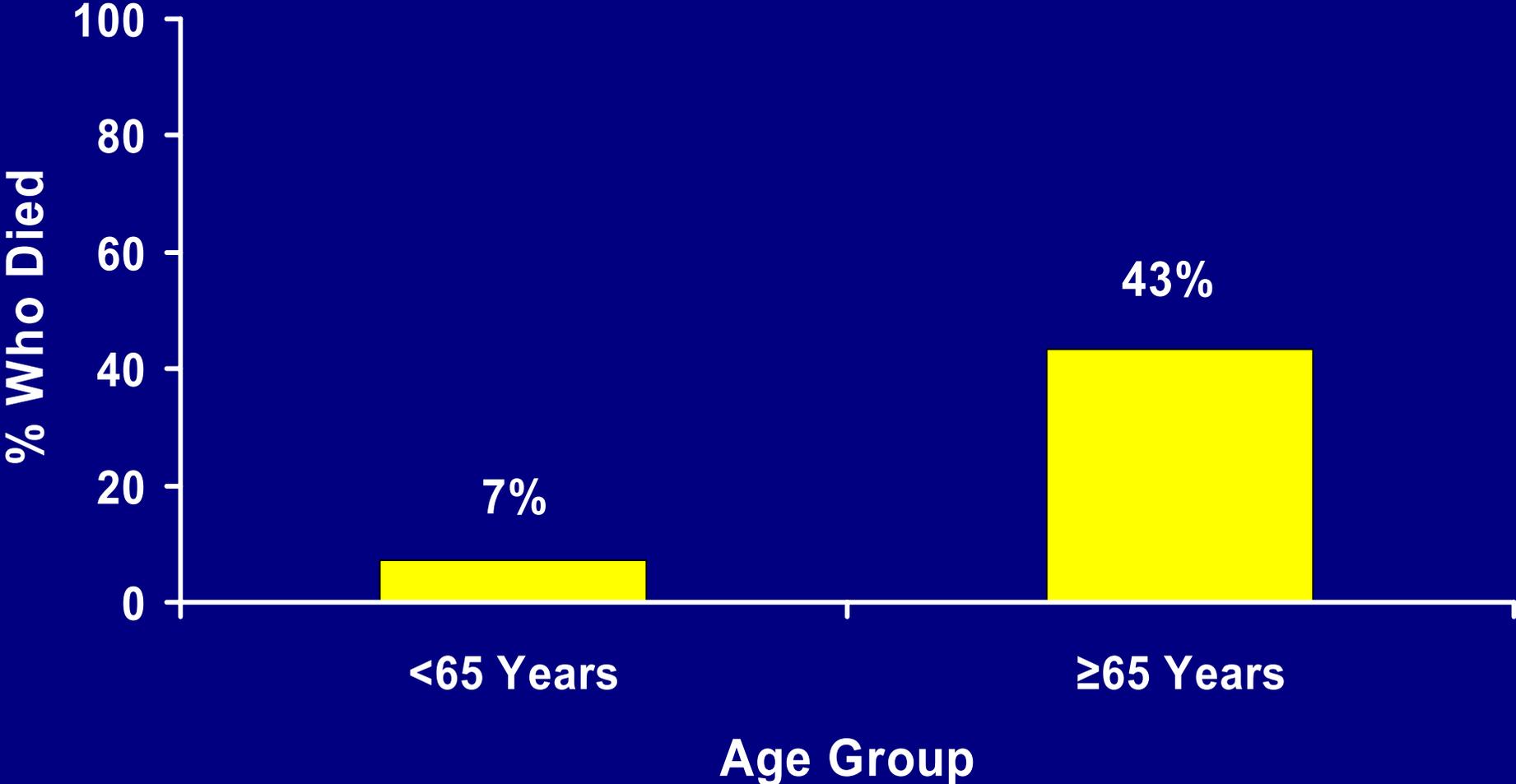


Association between Age Group, Sex and Rash

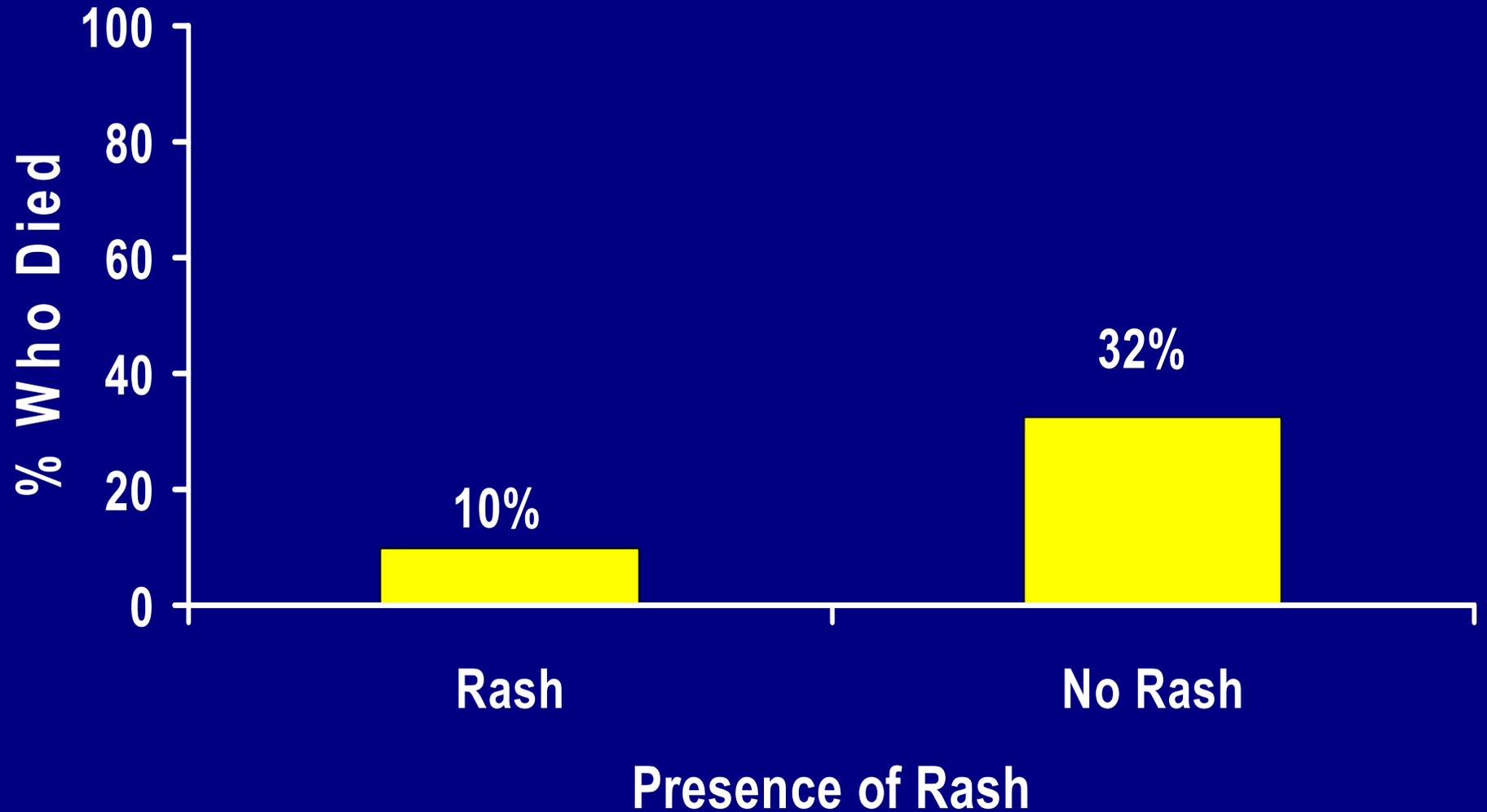
<u>Age Group</u>	<u>Male</u>		<u>Female</u>	
	<u>AOR*</u>	<u>(CI)</u>	<u>AOR*</u>	<u>(CI)</u>
<65 years	4	(3–6)	7	(5–10)
≥65 years	1	Ref	1	(0.6–2)

***Adjusted for disease category**

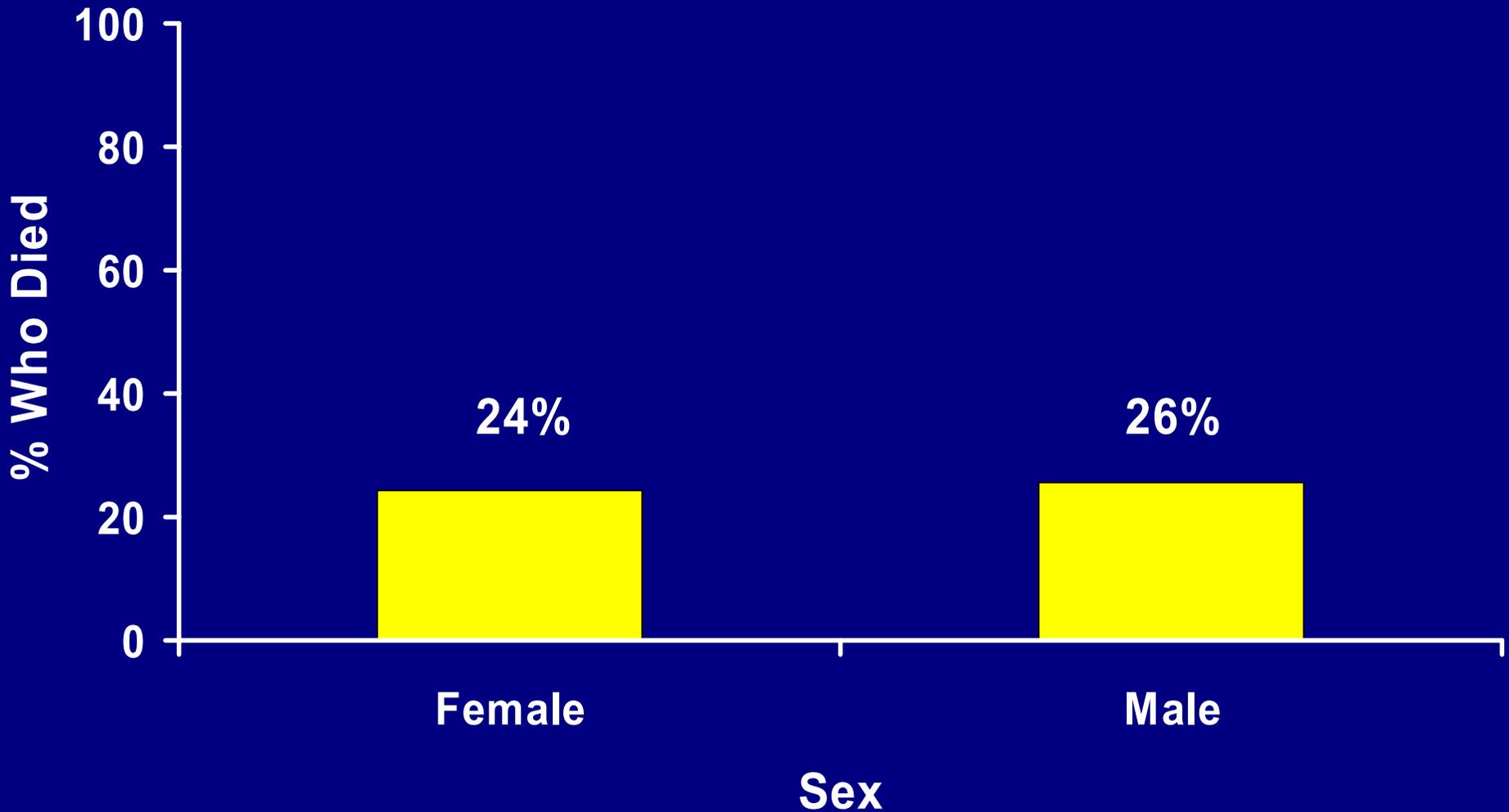
Encephalitis Deaths by Age Group



Encephalitis Deaths by Rash



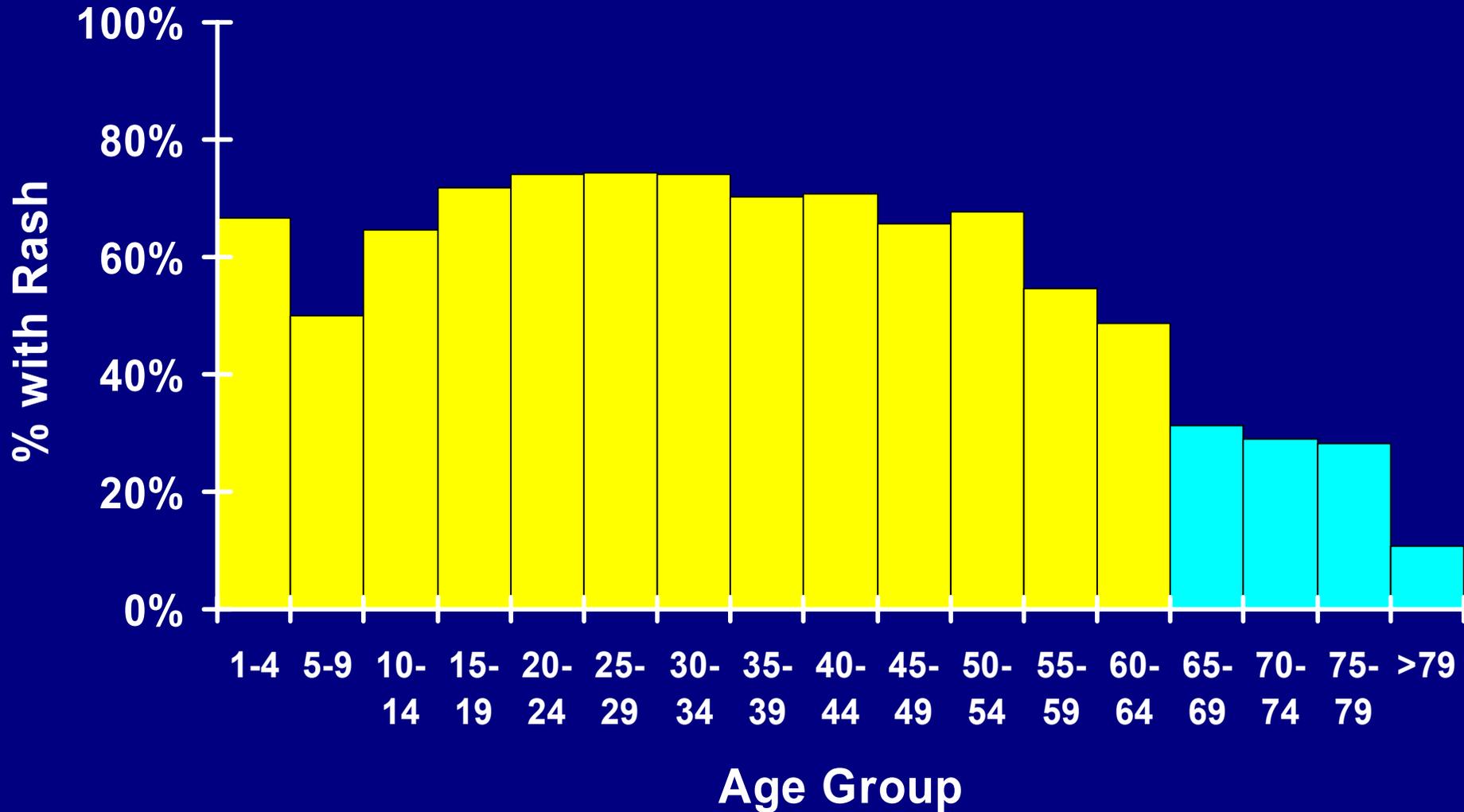
Encephalitis Deaths by Sex



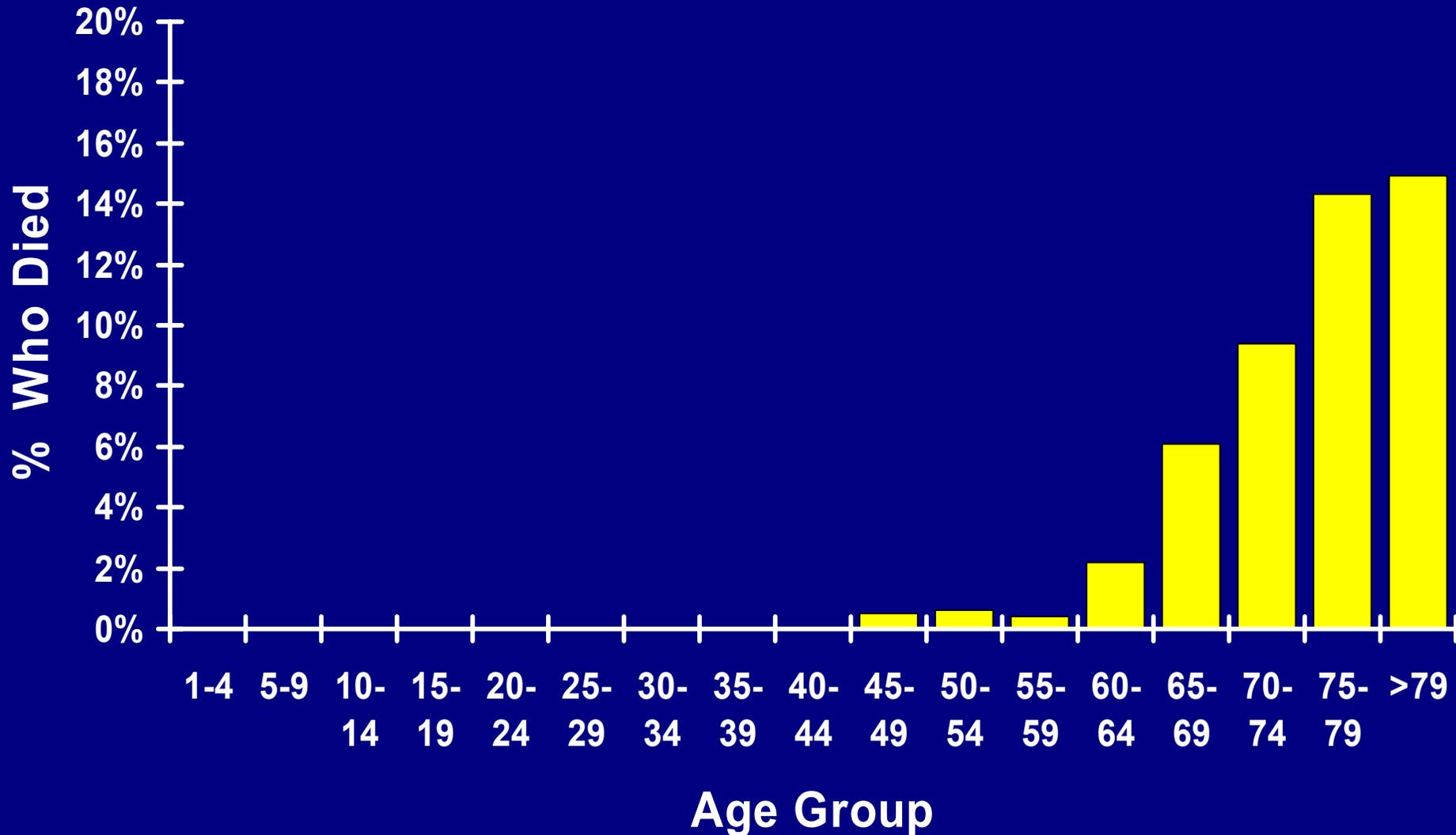
Discussion – Rash Frequency

Outbreak	% Rash	% Fever	Median age (years)
NYC (1999)	19	8	71
Israel (2000)	22	24	65
Israel (1950)	50	98	18–20
Illinois (2002)	57	100	<65
Colorado (2003)	60	77	47

Percentage with Rash by Age Group



Patients who Died by Age Group



Duration Between Illness Onset and Death

	Median Duration, d	Range
--	-------------------------------	--------------

No rash (N=54)	29	(1–248)
Rash (N=8)	29	(4–210)